

Research Projects

Thermoacoustic Dehumidifier

Developed a dehumidifier designed for atmospheric water generation, equipped with heat exchangers to exploit the cycle. Involved designing the device using Autodesk Inventor and Fusion 360 and manufacturing the device using 3D printing, machining, forming, and joining processes. Set up a thermocouple VI using LabVIEW to analyze the refrigeration cycle. Studied and optimized COP and condensation drainage using the data collected, an Excel and MATLAB math model of the device, as well as CFD simulations using Ansys Fluent. Successfully demonstrated a thermal gradient and collected condensed water from humid air with the constructed prototype. Shared details with faculty and peers in several PowerPoint presentations and a detailed technical report. Presented findings at ASME IMECE conference in Tampa, FL 2017. Published in the Journal of Energy Resources Technology.

Microfluidics Research

Analyzed the motion of red blood cells using the Navier-Stokes, Elasticity, and Bernoulli equations. The info was used to determine effects of clogged, rigid arteries on heart graft failure. Interpreted findings using FEA on modelled blood cell in Creo.

Electro-Mechanical Calibration

Calibrated instruments at our laboratory including a pressure transducer used in a wave tunnel, LVDT used to measure vibrations, Wheatstone bridge strain gauge used to measure beam deflection, and a load cell used in a hydraulic lift. These calibrations involved creating LabVIEW VIs that converted the output voltage from the sensors into a readable format.

Steam Power Plant Design

Developed Excel software using macros to analyze thermodynamic properties of ideal gases. This was used to design a schematic and optimize a steam turbine power plant. A T-S diagram was generated and component parameters were tuned to increase efficiency. Cited efforts in a detailed technical report and PowerPoint presentation as well as Poster Presentation for faculty and peers.

Stirling Engine Design

Designed and constructed a Stirling engine that ran off a single flame and cool reservoir, in order to demonstrate and understand thermodynamic engine cycles.